Pulmonary Radiographic Findings in Cystic Fibrosis in Adults

CYSTIC FIBROSIS in adults is no longer a rarity, not only because of advances in therapy which prolong life but also because less typical or severe cases can now be diagnosed with the aid of improved tests. In the past, in adults with the disease the diagnosis had been made at a later age than the average for all cases. In the future, however, the best prognosis may be found in patients diagnosed in the first few months of life, with or without symptoms; a recent study projected that three-fourths of such children would survive to the age of 20. It is of note that in two-thirds of adult cases the patients are men, and that the least affected adults are also usually men.

Radiographic findings in young adults with cystic fibrosis reflect the fact that all degrees of severity may be found in this age group. In the worst cases, the radiographs have all the findings of a typical childhood case: nodular shadows from mucus impaction or pus-filled bronchi, parallel line and ring shadows from bronchiectasis (predominantly cylindrical), soft parenchymal densities from focal pneumonia, and well-demarcated opacifications due to lobar, segmental, or focal atelectasis. Lung volume is increased, though not all patients have an increased anteroposterior diameter. Pathologically, however, destructive emphysema is minimal. The heart is usually narrow in diameter and vertical in position, with prominence of the right ventricular outflow tract on the lateral projection; the hila are prominent because of pulmonary hypertension, lymphadenopathy from chronic infection, and the surrounding radiolucency of over-expanded lungs.

Non-radiologists often use the term *fibrosis* to describe some of the linear or irregular markings in this disease, but real fibrosis is found only after unusually severe infections; most of these markings actually represent chronically infected airways and atelectasis. Characteristically, the bronchiectasis of cystic fibrosis differs from that of most other non-tuberculous causes in that it is most evident in the upper lobes. Similar findings may be found in patients with recurrent pulmonary infection due to immune deficiency or unknown cause. The upper lobe distribution is particularly striking in adults with less severe cystic fibrosis, effectively mimicking tuberculosis with sub-apical irregular nodular densities and segmental or upper lobar atelectasis. The mildest cases show only some degree of pulmonary over-expansion; other abnormal markings may be evident only during episodes of active infection.

The diagnosis of cystic fibrosis should be suggested whenever a young adult—often with a history of "asthma" or bronchitis or recurrent pneumonia— has radiographic evidence of chronic airway obstruction and infection, especially with bronchiectasis sparing the lung bases.

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REFERENCES

Shwachman H, Redmond A, Khaw KT: Studies in cystic fibrosis: Report of 130 patients diagnosed under 3 months of age over a 20-year period. Pediatr 46:335-343, 1970

Shwachman H, Kulczycki LL, Khaw KT: Studies in cystic fibrosis: A report of 65 patients over 17 years of age. Pediatr 36: 689-699, 1965

Tomashefski JF, Christoforidis AJ, Abdullah AK: Cystic fibrosis in young adults: An overlooked diagnosis, with emphasis on pulmonary function and radiological patterns. Chest 57:28-36, 1970

Analgesic Nephropathy: The Radiologist's Role in Diagnosis

RENAL DISEASE caused by the abuse of analgesic drugs, so-called analgesic nephropathy, is partially reversible and therefore important to diagnose early. It was formerly believed that phenacetin alone caused the disease, but the most recent evidence suggests that phenacetin may not be the only cause. In combination with other analgesics it produces renal damage, but there is evidence to suggest that aspirin alone in large doses, particularly associated with a decreased fluid intake, can cause identical damage.

The patients typically are neurotic women in the 30 to 60 year age group with a long history of vague back or abdominal pain or headaches, weakness and anemia. They often have had urograms because of urinary tract infection or unexplained pyuria.

In the early stages of the disease there is an interstitial nephritis and microscopic foci of papillary necrosis. At this time it is not possible to make the diagnosis from the x-ray studies although there may be some diminished concentration of contrast material in the collecting system. When the disease has progressed to radiographically visible areas of medullary necrosis or total papillary necrosis, the diagnosis should be suggested if sickle cell disease, diabetes, or obstruction with infection can be excluded.

The alert radiologist can be the first physician to elicit the telltale history by exploring in depth

the patient's analgesic intake over the previous ten years. Sometimes it is necessary to obtain this history from a friend or relative, since the patients rarely are honest regarding their intake of analgesic drugs.

Since urinary infection is a common secondary phenomenon in patients with analgesic nephropathy, it is important not to mistake the urographic findings for those of pyelonephritis. Patients have been misdiagnosed as having "chronic pyelonephritis" because of this association. When a club-shaped calyx is found in the presence of a smooth renal outline, papillary necrosis rather than atrophic pyelonephritis should be diagnosed. Occasionally sloughed papillae will remain *in situ* and calcify, appearing as typical ring-shaped calcifications on the plain film.

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REFERENCES

Abel JA: Analgesic nephropathy—A review of the literature, 1967-1970. Clin Pharmacol Ther 12:583-598, Jul-Aug 1971

Lindval N: Renal papillary necrosis—A roentgenographic study of 155 cases. Acta Radiol, suppl 192:1, 1960

Hare W: Scientific exhibit, First Asian Oceanian Congress of Radiology. Melbourne, Australia, Nov 1971

A Diagnostic Approach to Renal Mass Lesions

RECENT EXPERIENCE here and abroad shows that percutaneous puncture is a reliable means of diagnosing simple renal cysts. Exploratory operations for diagnostic purposes should be necessary in rare instances only. For the radiologist the problem has become one of selecting from all patients with renal masses those who are suitable for puncture—that is, those who are likely to have renal cysts. Although nephrotomography and angiography are accurate most of the time, neither is 100 percent diagnostic since avascular tumors may mimic renal cysts.

Ultrasonic B-scanning has become a reliable means of determining whether a renal mass is solid, cystic, or mixed. The streamlined work-up of a patient with renal cyst consists of the following steps: (1) establish the *presence* of a renal mass by urography or tomography or both, (2) establish the fluid-filled nature of the lesion by ultrasound, and (3) cyst puncture. With this approach, most patients with renal cysts need not have multiple view nephrotomography and arteriography. In lesions where the echo is indeterminate, mixed or solid, angiography is performed and the decision as to puncture or to operate can then be made.

After aspirating a portion of the cyst fluid for diagnostic purposes, water-soluble contrast medium is injected and cyst filming is carried out to assure that the cyst punctured accounts for the entire mass demonstrated on the urogram The diagnosis of tumor within a cyst is made on the basis of the findings in the aspirated fluid and may or may not be corroborated by the renal cystograms.

When the fluid aspirated from a cyst contains new or old blood and all the analyses of the fluid fail to demonstrate signs of malignancy and the cystogram is normal, the subsequent management may be open to debate. Although approximately 75 percent of these hemorrhagic cysts will prove to be benign, the experience with this type of lesion is too limited at present and, in good risk patients, surgical exploration is advisable to rule out tumor.

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REFERENCES

Asher WM, Leopold GR: A streamlined diagnostic approach to renal mass lesions with renal echogram. J Urol 108:205-208, Aug 1972

Jeans WD, Penry JB, Roylance J: Renal puncture. Clin Radiol 23:298-311, Jul 1972

Increased Sensitivity of 99mTc-Diphosphonate Over Radiography in Skeletal Imaging for Metastases

OSTEOBLASTIC LESIONS are perceived in conventional radiography only when the calcium concentration exceeds normal by at least 30 percent. The dense appearance of these lesions may persist even after clinically favorable response to therapy. Nuclear medical imaging, on the other hand, is not only more sensitive in detection, but also shows changes in the accumulation rate of radioactivity in the lesions reflecting success of the therapy.

The sensitivity of radioisotope techniques results from accelerated ionic exchange of the radionuclide with the crystal of bone in the lesions as compared with non-involved skeletal structures. Ethane-hydroxy diphosphonate labeled with technetium-99m is the currently preferred agent for radionuclide imaging of skeletal metastases. This localizes in the calcium hydroxy-apatite crystal of bone by chemisorption. Strontium-85 and strontium-87m exchange with the calcium of the crys-